DUAL HEAD PUMP DRIVEN FILTRATION SYSTEM

ABSTRACT OF THE DISCLOSURE

Improvements in product water throughput from a reverse osmosis (RO) membrane achieved by thinner feed spacers in the RO element **(22)**, enhanced recovery (ratio of permeate to feed), pressure recovery of the retentate fluid pressure opposing the feed water pressure, and fluid pulsing of the RO element feed stream. These features are preferably combined to optimize the performance and cost per unit volume of water produced. The system of the invention preferably comprises a dual head reciprocating pump **(20)**, an RO element **(22)** with a housing, and a differential pressure activated ("DPA") valve **(24)**. The DPA valve **(24)**, in combination with offsetting fluid pressures on the two pump heads **(28, 30)**, generate energy recovery. The frequency and amplitude of the reciprocating pump **(20)** create a pulse wave in the RO element **(22)** that improves permeate quality and throughput. A control system preferably monitors system parameters to optimize the reciprocating pump **(20)** speed and amplitude to tune the optimal frequency and amplitude required for maximum throughput and permeate quality from any given RO element **(22)** configuration.